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Title: Warhead Confirmation: A Follow-on to New START

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Warhead Confirmation: A Follow-on to New START

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What May Change?

New START

- Limits warheads on deployed delivery systems
- Warheads are declared and counted
- Radiation measurements
 - Verify absence - Measurements confirm objects declared to be non-nuclear

Future treaties

- May limit deployed and non-deployed warheads
- Radiation measurements
 - Verify presence?
 - Confirm dismantlement?
 - More intrusive?
 - Weapon type
 - Individual weapons
 - Weapon status

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Generic Arms Reduction Treaty

- The host makes a declaration concerning an item
 - Treaty Limited Item (TLI)
 - Host is owner of TLI
 - Declaration may include disposition path
- The monitoring party confirms this declaration
 - Monitor may be state or other entity
- Host seeks to ensure that only agreed information is revealed

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Challenges

- Evaluate the item/process presented (Confirmation)
- Protect the host country's classified information (Certification)
- Allow monitors to draw independent conclusions (Authentication)

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Dismantlement and Warhead Confirmation

- Dismantlement can be defined as separation of fissile material and high explosives.
 - Measurements - “Absence”, “Everything present”, or something else
 - Confirmation – of an “item,” or **a** declared TLI, or **the** specified TLI?
- No similar definition for “nuclear weapon”
 - Measurements - Characteristics, similarity, and/or history
 - Confirmation – How good, where, when?

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Confirmation Approaches

- **Trust:** Does the host have any reason to be deceptive?
- **Provenance:** Has the item undergone movements or come from a location consistent with being a warhead?
- **Template comparison:** Is the item consistent with other items known or believed to be warheads?
- **Attribute measurement:** Are specified (and agreed) item properties consistent with it being a warhead?

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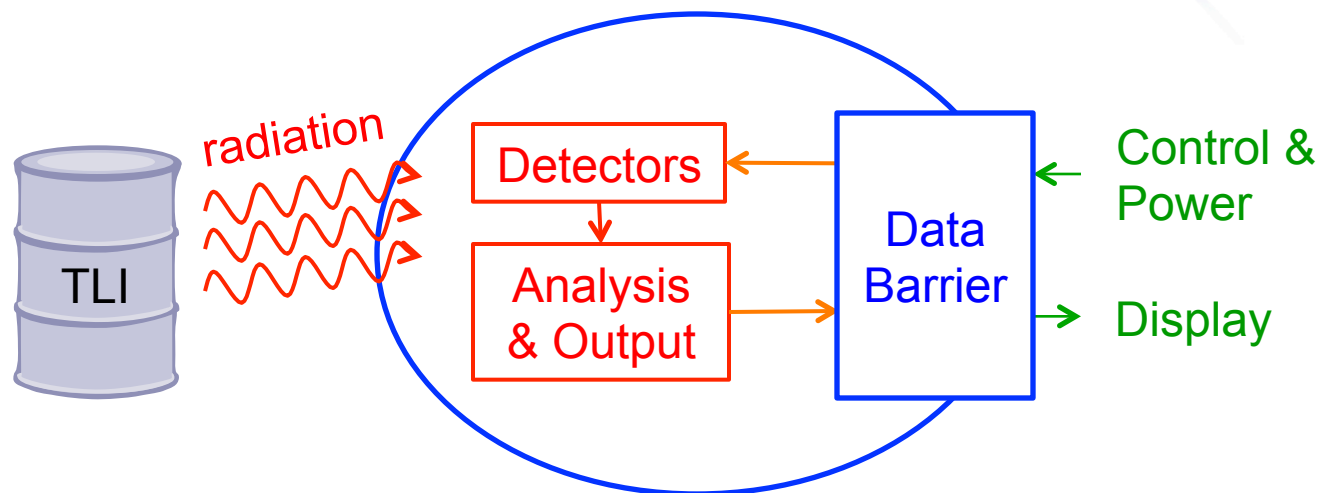
Certification

When monitors visit a Host storage facility...

- Host seeks to prevent the unauthorized release of information during a measurement while letting agreed results through.
- Should be robust against possible intelligence collection attempts.
- Information Barrier – hardware, software and procedures

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Information Barriers (IBs)

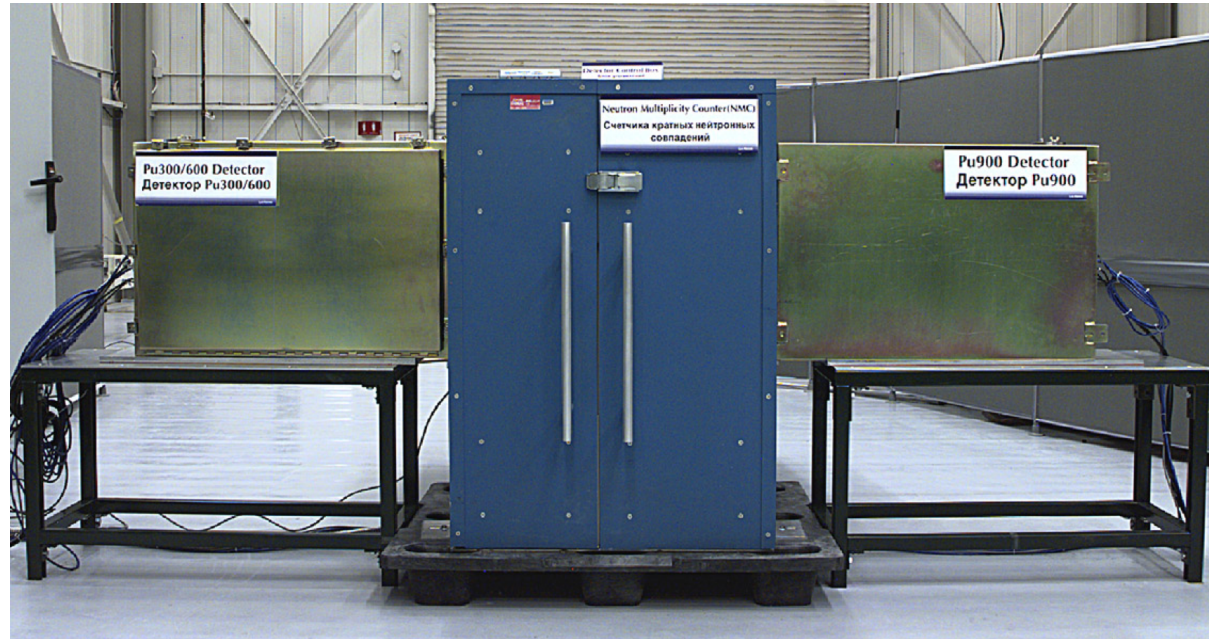


Potentially sensitive
Sensitive data within IB
Information barrier
Non-sensitive display

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The Fissile Material Transparency Technology Demonstration (FMTTD)

- LANL/LLNL collaboration
- Russian/USG audience
- Measurements on U.S. weapon component



Only measurement of its kind ever performed.

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More Recent Implementations



LANL: NG-AMS (Next Generation Attribute Measurement System)

VNIEF-LANL-LLNL: AVNG
(Attribute Verification Neutron Gamma)



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The Monitor's View



LANL: NG-AMS

VNIEF-LANL-LLNL: AVNG



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Authentication

- Everything interesting (the object, the measurement system, and the data) has been hidden.
- **Why should the monitors believe the red/green lights?**



VNIIEF-LANL-LLNL: AVNG

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Authentication Options

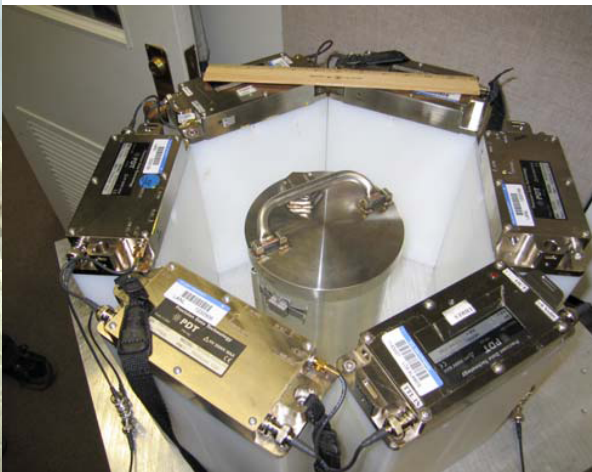
U.S./RF/IAEA: Trilateral Initiative



- Who gets it last?
- Confidence building
- Layered approach
- Integrated into measurement system



VNIEF/LANL/LLNL: AVNG



LANL: Modular Neutron Detector

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Authentication in Phases

- Design
 - Design for authentication
 - Joint design
 - Modular design
 - Open
- Fabrication
 - “Joint”
 - Agreed methods
- Testing
 - “module” testers
 - Functional testing
- Random selection
 - Any phase
 - Complex and expensive
 - Use when necessary
 - Allows monitoring party “private” inspection



VNIEF-LANL-LLNL: AVNG

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Future Treaties

- Confirmation of presence as opposed to confirmation of absence
- Three challenges
 - Confirmation
 - Certification
 - Authentication
- Four confirmation approaches
 - Trust
 - Provenance
 - Template comparison
 - Attribute measurement

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